ORIGINAL RESEARCH:

Impact Assessment of the Science and Technology Based Farm (STBF) Project on *PalayCheck System* Dissemination and Use: The Case of Small Farmers in Victoria, Tarlac, Philippines

Rowena P. de GUZMAN[1], Glenn Y. ILAR[2], Danesto B. ANACIO[3], Valoree MACAPUGAY[4]

Abstract

Many technological advances have been developed to increase agricultural productivity in the Philippines. However, the gap between production and consumption is continuously growing. Small-scale farmers face many challenges, which include high production costs at the farm level. Farmer Field School (FFS) was conducted to initially disseminate integrated pest management to address the problem. However, adoption was not fully met since farmers are tied into a "To see is to believe" principle. Thus, in 2010, a new initiative aiming to demonstrate the advantages of using quality rice seeds of the most preferred and newly released inbred and hybrid rice varieties was implemented by the government to increase the productivity and income of rice farmers in irrigated areas. This study assesses the impact of Science and Technology Based Farm Projects on adoption of Integrated Rice Crop Management (IRCM) specifically the *PalayCheck System*. Comparison groups consisting of STBF beneficiaries and non-beneficiaries were used to evaluate the impact of STBF project on *PalayCheck System* knowledge. One barangay in Victoria, Tarlac was used as a study site as it is one of the location where STBF was established. A survey and structured interviews were conducted to collect data. Data collected was for two seasons namely 2013 Wet Season and 2013 Dry Season. The results of the survey indicated that technical knowledge scores of STBF beneficiaries were greater than non-beneficiaries. It was also indicated that crop yields and farm income were greater for STBF beneficiaries. It was also shown that trainings attended was a significant variable in explaining adoption of the farmers. Though, STBF can be considered as an extension alternative for small rice farmers because of its participatory nature, there is still a need for improvements for sustainability within the context of agriculture in the Philippines.

Keywords: Science and Technology Based Farm, Integrated Rice Crop Management, Impact Evaluation, Field-based extension education

Introduction

The Philippine's agricultural sector continues to be significant to the country's economy with 12.09 million workers contributing 11% of the Gross Domestic Product (GDP). The main agricultural enterprise of the country is crop cultivation, wherein rice, as the major crop, has contributed up to 20% of the total agricultural GDP (BAS, 2012). However, given that rice production is capital intensive, small-scale farmers face many challenges. Viability of small-scale farmers to contribute to production has been vulnerable over the years for multiple factors, including high costs of labor, high costs of fertilizers and pesticides, the incidences of pests and diseases, natural calamity, as well as lack of price incentives from rice buying agents. Hence, the production rate of 18.03 million metric tons in 2012 is still not enough to answer rice demand forcing the country to rely on rice imports (FAO, 2009).

The problem with rice demand cannot be solved through dependence on imports from other countries, thus the government has developed and implemented a "Rice Self-Sufficiency Plan" as a response to the apparent rice shortage, then improved to include other staple crops like root crops, banana, maize, and others. The improved master plan was renamed "Food Staples Sufficiency Plan" (FSSP) which stipulated a

[1] Department of Social Sciences, College of Arts and Sciences, University of the Philippines Los Baños, College, Laguna. Email: rowenadeguzman0609@gmail.com; rpdeguzman2@up.edu.ph

[2] Philippine Rice Research Institute, Maligaya, Science City of Muñoz, Nueva Ecija, and College of Public Affairs and Development, University of the Philippines Los Baños

[3] School of Environmental Science and Management, University of the Philippines Los Baños

[4] DEPED-Western Bicutan National High School, Taguig City, and College of Public Affairs and Development, University of the Philippines Los Baños

change in target, and envisioned the country to be rice self-sufficient by 2016. The FSSP identifies three sets of interventions: to raise farm productivity and competitiveness; enhance economic incentives and enabling mechanisms; and manage food staples consumption (Food Staples Sufficiency Plan, 2013).

In 2010, the Philippine Rice Research Institute (PhilRice) in collaboration with the Philippine Council for Agriculture and Aquatic Resources Research and Development (PCAARRD) implemented a project entitled "Science and Technology-Based Farm (STBF) on Increasing Yield through the Utilization of Quality Rice Seeds of Recommended Varieties on selected Irrigated and Rainfed Areas" in the provinces of Tarlac, Occidental Mindoro, Leyte, Negros Oriental, Agusan del Sur, and Bukidnon. The general objective of this project is to demonstrate the advantages of using quality rice seeds of the most preferred and newly released inbred and hybrid rice varieties in increasing the productivity and income of rice farmers in irrigated areas. It aims to showcase the agronomic and yield performance of quality rice seeds of recommended varieties by establishing science and technology based farms (STBFs) which can also serve as learning fields for rice farmer-beneficiaries. The project also aims to impart knowledge and skills on participatory varietal selection and utilization of quality rice seeds as well as to promote the technology to farmers in irrigated rice-farming communities, and encourage them to adopt the technology in their respective farms through regular Farmers Beneficiaries Trainings (FBTs) (Bautista, et al., 2009).

Farmer Field School (FFS) is one type of agricultural intervention for boosting agricultural productivity, by allowing farmers together with the assistance of an expert, to experiment and learn from their own plots. In the case of Cameroon in Africa, David in 2007 points out that FFS provided farmers with new skills and knowledge in managing their cocoa plantations. Additionally, FFS graduates demonstrated superior knowledge on cocoa in general, as compared to non-FFS farmers. FFS also had good results in Peru, wherein a paper by Erin et al. (2003) showed that the participation of farmers can raise the average potato seed output/input ratio by approximately 52% of the average value in a normal year. Farmer's level of Integrated Pest Management (IPM) knowledge has a very significant effect on technology adoption (Erbaugh et al. 2010; Erbaugh, Donnermeyer & Kibwika, 2001). Thus, FFS increased the capacity of farmers to apply new technologies in their fields to assess their relevance to their specific circumstances, and promoted interaction with the researchers and extension workers for help, which were needed to solve a specific problem (Godrick & Khisa, in Muhammad et al., 2013).

The concept of STBF is also similar to FFS and the Location Specific Technology Development (LSTD) program implemented by PhilRice. The main difference is that STBF is done for four cropping seasons instead of one or two cropping seasons in the hope of greater technology adoption and project sustainability. Also, establishment of the STBF is considered to be the foundation stone of extension teaching because they are based on the basic principle of "seeing is believing". In a demonstration farm, an improved practice is presented in terms of its practical application of the different component technologies of *PalayCheck System* (an Integrated Rice Crop Management), the technology platform of the project under a specific situation. Successful demonstrations are very effective in convincing people. It is regarded as probably the most effective tool for technology transfer as it involves the three important processes of learning, which are seeing, hearing, and doing (Ilar, 2012).

Currently, agricultural agencies in the Philippines are in the process of streamlining its development efforts. Research and Development (R&D) is at the forefront in finding more innovative and relevant ways of disseminating technologies for greater technology adoption and sustainability. Assessing the impacts of the STBF project is needed to develop innovative and relevant ways of disseminating technologies, and determine reasons why technologies are hardly adopted or not adopted at all. It is in this premise that this study was conducted to assess the technologies presented in the STBF project and their subsequent impacts on the lives of the farmers and the farming community. The need for research on impacts of technology is important since the suitability of new technologies is essential, to identify knowledge that could support the design of appropriate policies with respect to their adoption. Furthermore, the introduction of new agricultural technologies has complex and diverse impacts on the socio-economic, socio-cultural, and socio-environmental, of intended or unintended, stakeholders of such particular technologies (Bisset in Rodrigues, Campanhola & Kitamura, 2003).

Factors that affect farmers in adopting agricultural interventions dictate whether such interventions are appropriate within the scope of the targeted area. Such factors are thus, essential for determining the level of impacts arising from implemented agricultural interventions. Numerous factors have been identified by a number of papers. One is farmer's income levels, wherein the research of Erbaugh et al. in 2010 found out that farmers in Uganda with higher total incomes were less likely to adopt IPM strategies shown in FFS. Another major factor mentioned in several papers is the level of knowledge possessed by farmers as a result of attending the FFS. Erbaugh et al. (2001) found out that participation in FFS is an effective mechanism for increasing both knowledge of IPM and the adoption of cowpea specific IPM strategies while the non-participants appear to be less knowledgeable. Improved knowledge translates to tangible benefits, such as reduced pesticide use and increased productivity (van den Berg, in David, 2007; Erbaugh, Donnermeyer & Kibwika, 2001; Praneetvatakul and Waibel, 2006). Moreover, since specific agricultural technologies have particular goals, such as increasing yield, reducing farming costs, higher profit, etc., observed impacts revolve around these pre-determined objectives. Clearly defined objectives are thus important for better assessing impacts from agricultural technologies.

Previous research in technological innovations adoption stresses that awareness and knowledge of a new technology is crucial in the adoption or decision-making process (Rogers, 1995). Hence, an ex-post analysis of the STBF project in Barangay Masalasa in Victoria, Tarlac is essential in describing the impacts of the project in order to plan succeeding interventions. The results will also guide development workers in crafting and implementing development projects that will be relevant to address the needs of the farming communities.

Purpose and Objectives

The main purpose of this study was to assess the impacts of the STBF project on the adoption of *PalayCheck System* component technologies by small-scale farmers in Victoria, Tarlac. The relationship between enhanced *PalayCheck System* knowledge and adoption was also examined. Participatory approaches and FFS have placed more emphasis on increasing knowledge and awareness of key concepts and creating enhanced learning through group collaborative effort. This evaluation is an attempt to provide a framework for merging these two approaches by assessing both increases and adoption of the *PalayCheck System*. The specific objectives were to: (a) compare STBF beneficiaries and non-beneficiaries on knowledge of *PalayCheck System*; (b) compare STBF farm beneficiaries and non-beneficiaries on the adoption of the *PalayCheck System* component technologies; and (c) determine the impact of STBF project on the socio-economic aspect of the beneficiaries.

Methodology

Evaluation Approach

The assessment of STBF participation on the adoption of IRCM strategies agrees to the Targeting Outcomes of Programs (TOP) model suggested by Bennett and Rockwell (2004). The model involves seven levels to guide both program development and assessment. These levels are arranged hierarchically with each level serving as a step towards achieving program impacts.

This assessment focused on the Level 3 (KASA) which refers to Knowledge, Attitude, Skills, and Aspirations that influence the adoption of selected practices and technologies that help in achieving expected outcomes. Changes in KASA can occur when people react positively to their participation in program activities. Increased awareness and knowledge are generally considered prerequisites to the adoption of new practices and technologies, including IRCM (Rogers, 1995). Since farmer adoption of the *PalayCheck*

System component technologies was an important project goal, this study assesses the effectiveness of STBF in achieving this goal.

Population and Sample

A total of twenty-four (24) farmers were selected from the roster of the STBF project beneficiaries in Brgy. Masalasa, Victoria, Tarlac. There were originally 32 farmer-beneficiaries but due to reasons including others no longer farming because of other jobs, and one farmer died already, only 24 STBF beneficiaries were interviewed. Scheduled interviews were employed instead of self-administered to gather quality data to avoid confusion on the survey instrument. Another group of participants served as a comparison group. These are the people assumed to have not attended any training under the STBF project conducted by PhilRice. Contrary to the first group, the comparison group composed of the same number of farmers were selected using the systematic random sampling. The list was obtained from the Agricultural Extension Worker (AEW) assigned in the area validated by the Local Barangay Officials headed by the in-charge on the Committee on Agriculture. The final sample consisted of 24 STBF beneficiaries and 24 non-beneficiaries for a total sample size of 48 (n=48).

Structured Key Informant Interviews were also conducted with the Farmer Cooperator of (STBF project) and Extension Workers (EWs) assigned in the area to gain insights from perspectives of the implementers.

Data Collection and Instrumentation

A questionnaire was developed from previous instruments used to examine socio-economic background characteristics. Added to the instruments were specific questions designed to measure adoption of the *PalayCheck System* component technologies, knowledge of *PalayCheck System* attributes, and STBF assessments. A team of enumerators conducted a pre-test of the instrument with five farmers not included in the sample. Pre-tested and revised questionnaires were completed through personal interviews conducted by the researchers with the farmers.

Group Comparability

To assess the impacts of STBF on knowledge of the *PalayCheck System* and the adoption of the *PalayCheck System* component technologies, the degree of comparability between STBF beneficiaries and non-beneficiaries was assessed. This was deemed necessary to check for sample selection bias. Using a T-test of mean differences, the two groups were compared on the basis of socioeconomic criteria including age, years of education, household size, farm size, total family income and trainings attended. A T-test of mean differences was used to assess the impact of FFS on awareness/knowledge of *PalayCheck System*. A summated ratings scale consisting of five attributes of *PalayCheck System* knowledge was used as the dependent variable. Zero-order correlations among all variables in the model were used to determine its relation to the adoption of *PalayCheck System* component technologies.

Results and Discussion

Group Comparability

Table 1 shows the comparison of STBF beneficiaries and non-beneficiaries on key socio-economic variables to give a larger picture about the characteristics of each farmer group. The results indicate significant mean differences between the groups on years of education, farm size and trainings attended. STBF beneficiaries were more likely have completed more years of formal education, own larger farms and attended trainings. There were no significant differences between the two groups on age, household size and family income.

Item Description	STBF beneficiaries	STBF non-beneficiaries	df	T
Age	47.7 (11.56)	49.25 (12.60)	46	-.442
Years of Education	10.67 (3.06)	8.67 (2.73)	46	2.39*
Household Size	4.63 (1.47)	4.29 (1.63)	46	.745
Farm Size	2.26 (1.65)	1.33 (.68)	46	2.54*
Family Income (Farm & off farm)	74912.50 (1.01)	78303.75 (1.44)	46	-.094
Trainings Attended	1.0 (.00)	.21 (.41)	46	9.35*

Values in parentheses ( ) are standard deviations;

[1] Equal variances assumed; *t-test significant at $p<0.05$

Table 1: Means, Standard deviations and Significance levels for Items Comprising Age, Years of Education, Household Size, Farm Size, Family Income and Trainings Attended of STBF Beneficiaries and Non-beneficiaries in Brgy. Masalasa, Victoria, Tarlac

Impact of STBF project on Knowledge of PalayCheck System

This research investigated the impact of participation in the STBF project by comparing technical knowledge scores for the *PalayCheck System*. A T-test of mean differences was used to assess the impact of the STBF project on a summated ratings scale of *PalayCheck System* knowledge (*Table 2*). For a *PalayCheck System* knowledge attribute such as Use of Quality Seeds, Proper Nutrient Management, and Proper Pest Management, a statistically significant difference was found between the two groups. These indicate that farmers who participated in the STBF project are more knowledgeable in these three crop management areas. This can be supported by the result of the key informant interview with the AEW that these three crop management areas were given emphasis during the FBTs done during the implementation of the project. There was also significant difference in the total *PalayCheck System* knowledge scores for STBF beneficiaries (M=139.8, SD=15.7) and non-beneficiaries (M=125.3, SD=13.8); $t(46)=3.39$, $p<0.05$. These results suggest that STBF project does have an effect on the knowledge of the *PalayCheck System*. Specifically, the results suggest that when farmers participated in the STBF project, their knowledge on the *PalayCheck System* increases.

Item Description	STBF beneficiaries	STBF non-beneficiaries	df	T
Use of Quality Seeds	7.96 (1.49)	6.83 (2.14)	41	2.114*
Proper Land Management	13.13 (1.80)	12.00 (2.45)	42	1.813
Proper Crop Establishment	8.58 (1.56)	8.42 (1.42)	46	0.388
Proper Water Management	13.21 (1.64)	12.42 (2.02)	44	1.490
Proper Nutrient Management	26.08 (3.59)	22.32 (2.41)	40	4.253*
Proper Pest Management	26.13 (3.23)	23.75 (2.77)	45	2.732*
Proper Harvest Management	44.33 (4.86)	41.54 (7.38)	40	1.547
PalayCheck System Knowledge Scale (N=170)	139.83 (15.72)	125.28 (13.78)	46	3.390*

Scale adjusted Cronbach's Alpha = .941; Values in parentheses ( ) are standard deviations;

[1] Equal variances assumed; *t-test significant at $p<0.05$

Table 2: Means, Standard deviations and Significance levels for Items Comprising *PalayCheck System* Knowledge Scale by STBF Beneficiaries and Non-beneficiaries in Brgy. Masalasa, Victoria, Tarlac

Adoption of PalayCheck System Specifically on Nutrient and Pest Management

Based on the Focus Group done before the implementation of the STBF project, the weaknesses of the farmers in relation to their rice production management are on nutrient and pest management. To enhance their weaknesses, these management areas were given emphasis during the FBTs. In terms of nutrient management, the use of Leaf Color Chart (LCC) was recommended. LCC is a handy plastic “ruler” with strips of four shades of green used to compare the color of rice leaves under field conditions and to measure the green color intensity of leaf which corresponds to the plant’s nitrogen content. In addition to this, farmers must conduct Minus-One-Element Technique (MOET) test 30 days before transplanting or direct weeding to determine soil nutrient deficiencies (PalayCheck Booklet). These technologies were recommended to prevent over usage of fertilizers. For the pest management, insect pest identification was recommended as well as natural enemies (beneficial organisms) and diseases to determine what action or kinds of pesticides to be used. All five *PalayCheck System* component technologies (see *Table 3*) were coded 0, if farmers had not adopted, and coded 1, if farmers had adopted the specific technology then combined into summated adoption scales. Adoption Scales used all five component technologies, with a score ranging from 0-5 and a coefficient reliability of .990. Zero-order correlations among all variables in the model in relation to *PalayCheck System* strategies are presented in *Table 3*. Considering that STBF beneficiaries were more likely have completed more years of formal education, own larger farms and attended trainings, results indicate that adoption of five recommended *PalayCheck System* Strategies was mostly highly correlated with farm size, knowledge on *PalayCheck System* and trainings attended. All other correlations were not significant at the $P \leq .05$ level.

N=48	Adoption Scale	Age	Years of education	Farm Size	Knowledge Score	Trainings Attended	Family Income
Adoption Scale	1.00						
Age	-.088	1.00					
Years of Education	.256	-.219	1.00				
Farm Size	.268	-.047	.559*	1.00			
Knowledge Score	.478*	-.070	.216	-.003	1.00		
Trainings Attended	.740*	-.086	.392*	.347*	.439*	1.00	
Family Income	.001	-.012	.292*	.058	.113	-.121	1.00

a. Cells contain zero-order (Pearson Correlation)

*. Correlation significant at 0.05 level

Table 3: Zero-order correlations between the Adoption of Recommended Six *PalayCheck System* Strategies

The adoption of specific *PalayCheck System* component technologies by STBF beneficiaries and non-beneficiaries is shown in *Table 4*. The table shows that there are significant mean differences between the two groups on the adoption of all *PalayCheck System* component technologies $P \leq .05$ level, and it can be noted that among the non-beneficiaries, none of them have used the different strategies (M = .000; SD = .000).

Item Description	Range	STBF beneficiaries	STBF non-beneficiaries	df	T
LCC	0-1	.917 (.282)	.000 (.000)	46	15.906*
MOET	0-1	.792 (.415)	.000 (.000)	46	9.349*
Insect Pest Identification	0-1	.917 (.282)	.000 (.000)	46	15.906*
Natural Enemies Identification	0-1	.917 (.282)	.000 (.000)	46	15.906*
Disease Diagnosis	0-1	.917 (.282)	.000 (.000)	46	15.906*

Adoption Scale	0-5	4.412 (1.412)	.000 (.000)	46	15.328*

Scale adjusted Cronbach's Alpha = .990; Values in parentheses ( ) are standard deviations;
[1] Equal variances assumed; *t-test significant at $p<0.05$

Table 4: Means, Standard deviations and Significance levels for Items Comprising *PalayCheck System* Adoption Scale by STBF Beneficiaries and Non-beneficiaries in Brgy. Masalasa, Victoria, Tarlac

To determine whether being beneficiaries in an STBF project had an effect on the adoption of *PalayCheck System* component technologies, this research then established the extent to which attending FBTs affects adoption variance. To this end, a multiple regression model was used in which the dependent variable is the *PalayCheck System* Adoption Scale. The results of the analysis is shown in *Table 5*. Together, the independent variables explain .599 (R^2), or in percentage terms, 59.9%, of the variation in the adoption of *PalayCheck System* component tecnologies. Attending FBTs appear to be a strong predictor for the adoption of the component technologies. These results suggest that attending FBTs where the venue of increasing knowledge on *PalayCheck System* component technologies are more likely to contribute to its adoption..

Variables	Standard Coefficients	t
Adoption Scale (constant)	-3.42	
Age	-.20	-.185
Years of Education	-.147	-1.062
Farm Size	.077	.572
Knowledge Score	.200	1.714
Trainings Attended	.691	5.385*
Family Income	.070	.594
Multiple R	-	
R Square	.599	
Adjusted R Square	.529	
Durbin Watson (DW) test statistic	1.397	
F Value	8.552	

*t-test significant at $p<0.05$

Table 5: Results of the Regression Model

Impact of STBF Project on the Crop yield, Farm inputs Cost and Farm income

Previous literatures assert that improved knowledge translates to tangible benefits, such as reduced pesticide use and increased productivity. It is assumed that when STBF beneficiaries adopted, or partially adopted the different component technologies they learned from the training, it increased their yields and eventually their income. A T-test of mean difference was used to assess the impacts of STBF projects on crop yield, farm input costs, and farm income. *Table 6* shows a comparison between the mean differences of the two groups on the different variables during the wet season (WS) and dry season (DS) in 2013. In terms of crop yield, the results indicate significant mean differences between the groups on crop yield during the wet and dry seasons. STBF beneficiaries were more likely to produce higher yield than non-beneficiaries both for two seasons. Though, there was no significant difference between the two groups on the total crop yield, it can be noted that STBF beneficiaries produce higher yields (M = 10.27; SD = 2.42) than non-beneficiaries (M = 9.27; SD = 2.71). The results suggest that being the beneficiaries of the STBF project contributed to their higher yield.

Since it was highlighted in the trainings that proper nutrient and pest management must be done effectively and efficiently, it is assumed that STBF beneficiaries will be more likely to decrease in their usage of fertilizers and pesticides. To determine if there is a decrease in fertilizers and pesticides used, the same statistical analysis was used. Farm input costs include only the expenses incurred by both groups in terms of the fertilizers and pesticides they used. For the farm input costs during the wet and dry season, a statistically significant difference was found between the two groups. These indicate that farmers who participated in the STBF project have a decrease in their use of fertilizers and pesticides than non-beneficiaries. There was also a significant difference in the total farm input cost for STBF beneficiaries (M=14,958.33, SD=3,277.00) and non-beneficiaries (M=18,283.79; SD=6,005.60); $t(46)=-2.381$, $p<0.05$. These results show that the STBF project does have an effect on the fertilizer and pesticide use of the farmers. Specifically, these results suggest that when farmers participated in the STBF project, their use of fertilizers and pesticides decreased.

To determine the impact of the STBF project on the farm income of the farmers, a T-test comparing the two groups was used. Computed mean differences on farm income shows that there is a significant effect for STBF beneficiaries $t(46) = 2.721$, $p<0.05$, with STBF beneficiaries having higher income during 2013. This was also true with Farm income during the wet season, $t(46)=3.169$, $p<0.05$ and dry season, t(46)2.032, $p<0.05$. The results suggest that being the beneficiaries of STBF project contributed to their increase in farm income.

Item Description	STBF beneficiaries	STBF non-beneficiaries	df	T
Total Crop Yield (2013), *ton/ha*	10.27 (2.42)	9.27 (2.71)	46	1.357
Crop Yield (WS, 2013), *ton/ha*	5.86 (1.35)	4.75 (1.27)	46	1.998*
Crop Yield (DS, 2013), *ton/ha*	4.42 (1.27)	3.50 (1.54)	46	2.241*
Total Farm Inputs Cost (2013), *Php/ha*	14,958.33 (3,277.00)	18,283.79 (6,005.60)	46	-2.381*
Farm Inputs Cost (WS, 2013), *Php/ha*	6,683.54 (1,782.89)	8,323.50 (3,135.90)	46	-2.227*
Farm Inputs Cost (DS, 2013), *Php/ha*	8,274.79 (1,918.99)	9,960.29 (3,145.92)	46	-2.241*
Total Farm Income (2013), *Php/ha*	59,760.47 (17,363.77)	46,971.39 (22,764.47)	46	2.721*
Farm Income (WS, 2013), *Php/ha*	71,722.29 (18,492.23)	55,269.17 (18,757.88)	46	3.169*
Farm Income (DS, 2013), *Php/ha*	96,718.33 (23,765.24)	80,948.13 (29,681.32)	46	2.032*

Values in parentheses ( ) are standard deviations;

[1] Equal variances assumed; *t-test significant at $p<0.05$

Table 6: Means, Standard deviations and Significance levels for Items Comprising Crop Yields, Farm Inputs Costs and Total Farm Income in 2013 of STBF Beneficiaries and Non-beneficiaries in Brgy. Masalasa, Victoria, Tarlac

Conclusions

STBF project was found to be effective in enhancing farm income, technical knowledge and crop yields. These findings provide a confirmation in favor of the adoption of the decision making process, and validation that STBF project is an effective mechanism for increasing both knowledge and adoption of the *PalayCheck System* component technologies. However, it is recommended that the approach be continued as a means of a in disseminating *PalayCheck System* component technologies among farmers.

Adoption of the *PalayCheck System* component technologies can be explained by being the beneficiaries of the STBF project. Farmers who have completed more years of formal education, own larger farms and attended trainings are more likely to adopt the *PalayCheck System* component technologies. But it is also noteworthy that attending FBTs where the venue of increasing knowledge on *PalayCheck System* component technologies are more likely to contribute in its adoption.

However, there is still a need to involve other stakeholders through social assessments. In this light, achievement of reduction of farm inputs costs through the different use of the component technologies under *PalayCheck System* could be established.

Another implication of this study for extension programs in all countries is that the strategy of sustained field-based extension education such as the STBF is important. Change in behavior, such as the adoption of *PalayCheck System* component technologies, cannot be expected without a sustained understanding of the technology. González-Flores et al. (2014) have also discovered in Ecuador that although farmers have significantly adopted technological change, the level of adoption is still in a "learning by doing" process. Technology adoption will not always be full or complete initially, since particular adoption periods need to be observed. Policy instruments could play certain roles in technology adoption, relying on polices alone is not enough. Information and education campaigns (IEC) in tandem with policy instruments may work better since it can be observed farmers would not completely apply the whole technology package, but rather do so in a sequential manner. Thus, there is still a need for follow up for sustainability within the context of agriculture in the Philippines, such as increasing the access to extension services together with participatory approaches (such as STBF).

References

Bautista, E.U., et al. 2009. Rolling Out Techno Gabay Rice Program for Sufficient Food on the Table. Sub-Program 3: S&T-Based Farms on Rice Production in Selected Irrigated and Rainfed Areas. Project Proposal.

Benett, C. and Rockwell, K. 2004. Targeting Outcomes of Programs: A Hierarchy for

Targeting Outcomes and Evaluating Their Achievement. Faculty Publications: Agricultural Leadership, Education & Communication Department. Paper 48. http://digitalcommons.unl.edu/aglecfacpub/48

Bureau of Agricultural Statistics 2012. Philippine Agricultural Figures in 2012. Retrieved December 30, 2013, from http://countrystat.bas.gov.ph/?cont=3

David, S. 2007. Learning to Think for Ourselves: Knowledge Improvement and Social Benefits among Farmer Field School Participants in Cameroon. *Journal of International Agricultural and Extension Education*. 14 (2).

Erbaugh, J.M., J. Donnermeyer, M. Amujal and M. Kidoido. 2010. Assessing the Impact of Farmer Field School Participation on IPM Adoption in Uganda. *Journal of International Agricultural and Extension Education*. DOI: 10.5191/jiaee.2010.17301

Erbaugh, J.M., J. Donnermeyer and P. Kibwika. 2001. Evaluating Farmers' Knowledge and Awareness of Integrated Pest Management (IPM): Assessment of the IPM Collaborative Research Support Project in Uganda. *Journal of International Agricultural and Extension Education*. Spring 2001

Erin, G., E. Sadoulet, A. de Janvry, R. Murgai and O. Ortiz. 2003. The Impact of Farmer-Field-Schools on Knowledge and Productivity: A Study of Potato Farmers in the Peruvian Andes. CUDARE Working Papers, Department of Agricultural and Resource Economics, UC Berkeley

Food and Agriculture Organization of the United Nations. 2009. FAO Initiative in Soaring Food Prices. Retrieved December 30, 2013, from http://www.fao.org/isfp/country-information/philippines/en/

Food Staples Sufficiency Program: Enhancing Agricultural Productivity and Global Competitiveness 2011-2016. Department of Agriculture. Office of the Secretary. National Rice Program. Diliman, Quezon City.

González-Flores, M., Bravo-Ureta, B. E., Solís, D., & Winters, P. 2014. The impact of high value markets on smallholder productivity in the Ecuadorean Sierra: A Stochastic Production Frontier approach correcting for selectivity bias. *Food Policy*, 44, 237–247. doi:10.1016/j.foodpol.2013.09.014

Ilar, G.Y. 2012. STBF on Increasing Yield through Utilization of Quality Rice Seeds of Recommended Varieties. Terminal Report. Philippine Rice Research Institute, Maligaya, SC of Munoz, Nueva Ecija.

Muhammad, S., et.al 2013. Impact of Farmer Field Schools on Social Wellbeing of Farming Community in Khyber Pakhtunkhwa, Pakistan. *The Journal of Animal & Plant Sciences*, 23(1): 2013, Page: 319-323 ISSN: 1018-7081. Retrieved January 1, 2013, from http://www.thejaps.org.pk/docs/v-23-1/49.pdf

Praneetvatakul, S. and H. Waibel. 2006. Impact Assessment of Farmer Field Schools using A Multi-Period Panel Data Model. Paper presented at the International Association of Agricultural Economist Conference, Gold Coast, Australia, August 12-18, 2006

Rodrigues, G. S., Campanhola, C., & Kitamura, P. C. 2003. An environmental impact assessment system for agricultural R&D. *Environmental Impact Assessment Review*, 23(2), 219–244. doi:10.1016/S0195-9255(02)00097-5

Rogers, E. (1995). *Diffusion of innovation*. (Fourth Edition). New York: Free Press.